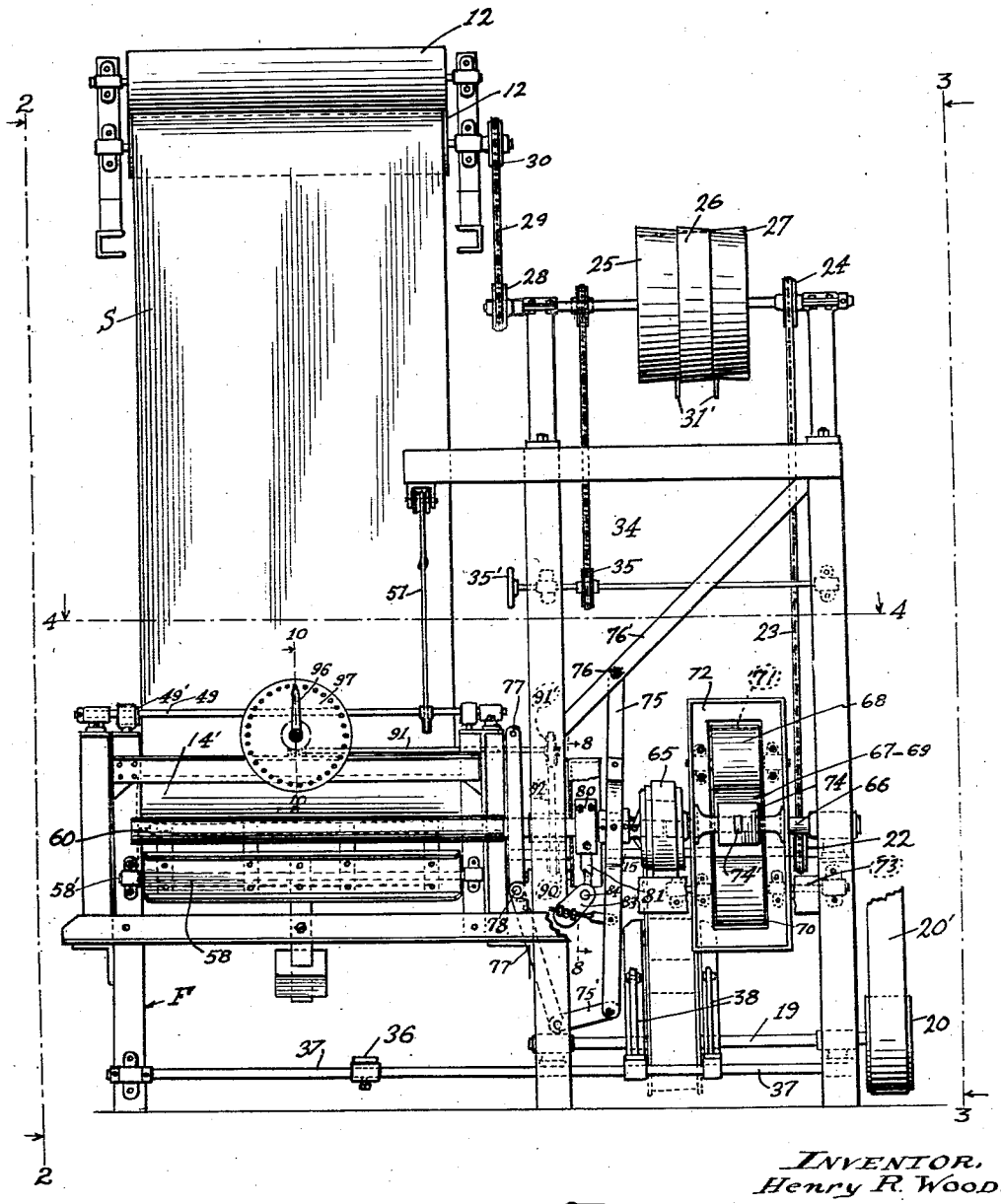
May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

Filed Oct. 10, 1928 8 Sheets-Sheet 1

FIG. 1.



INVENTOR,
Henry R. Wood.

Edmund G. Strauss.

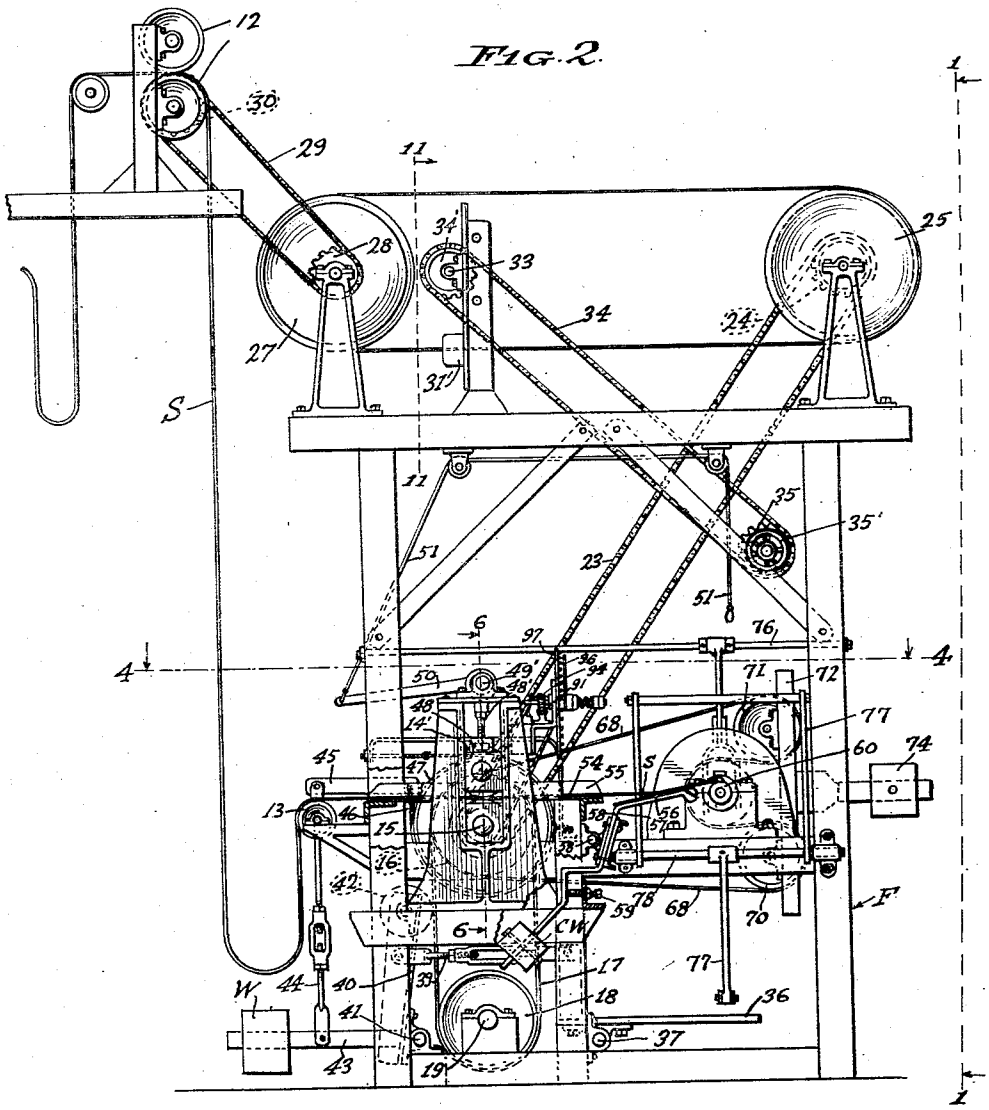
ATTORNEY.

May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

Filed Oct. 10, 1928 8 Sheets-Sheet 2

FIG. 2.



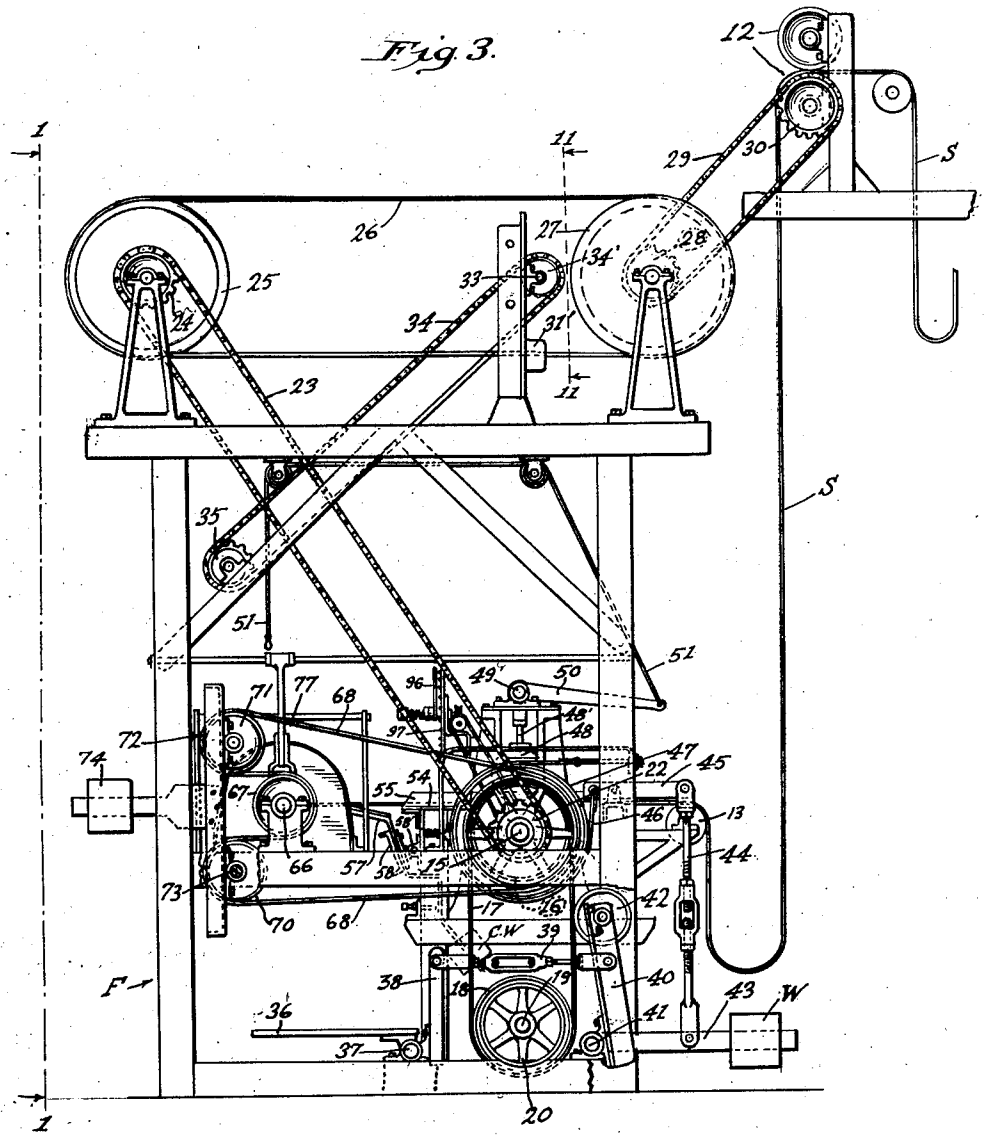
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May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

Filed Oct. 10, 1928 8 Sheets-Sheet 3

Fig. 3.



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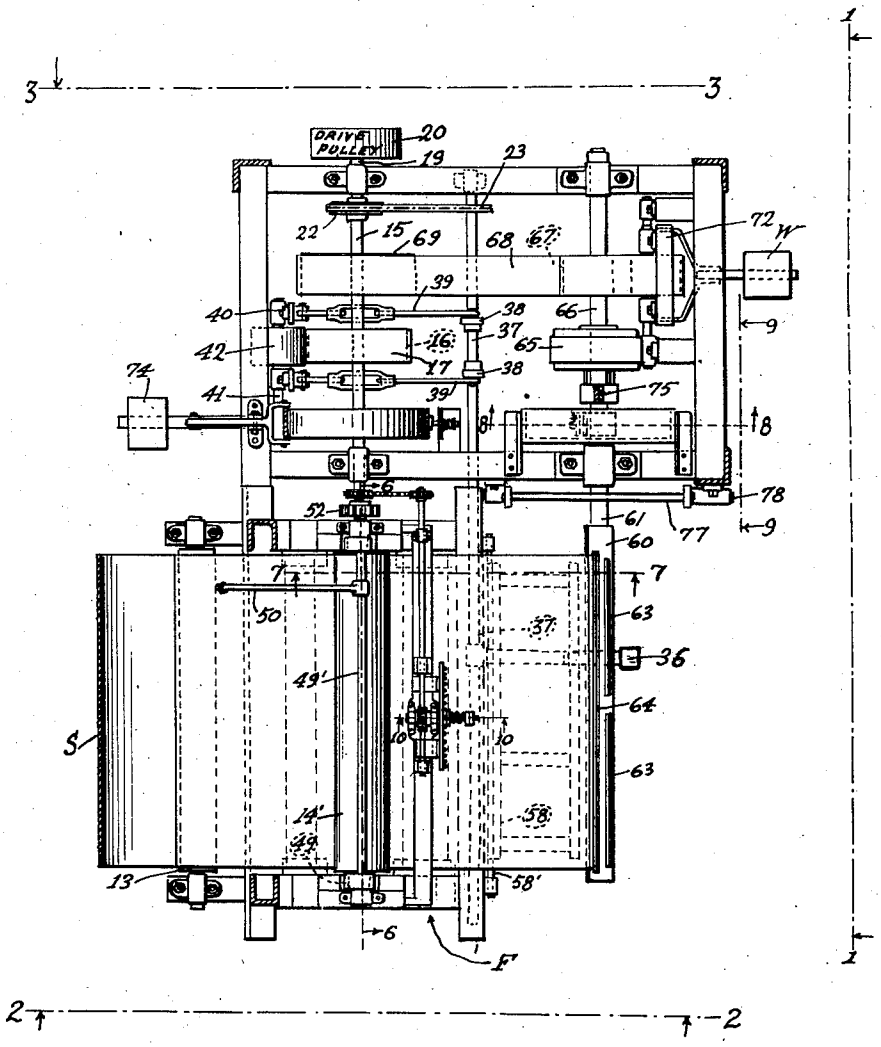
Edmund F. Thomas,
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May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

Filed Oct. 10, 1928 8 Sheets-Sheet 4

FIG. 4



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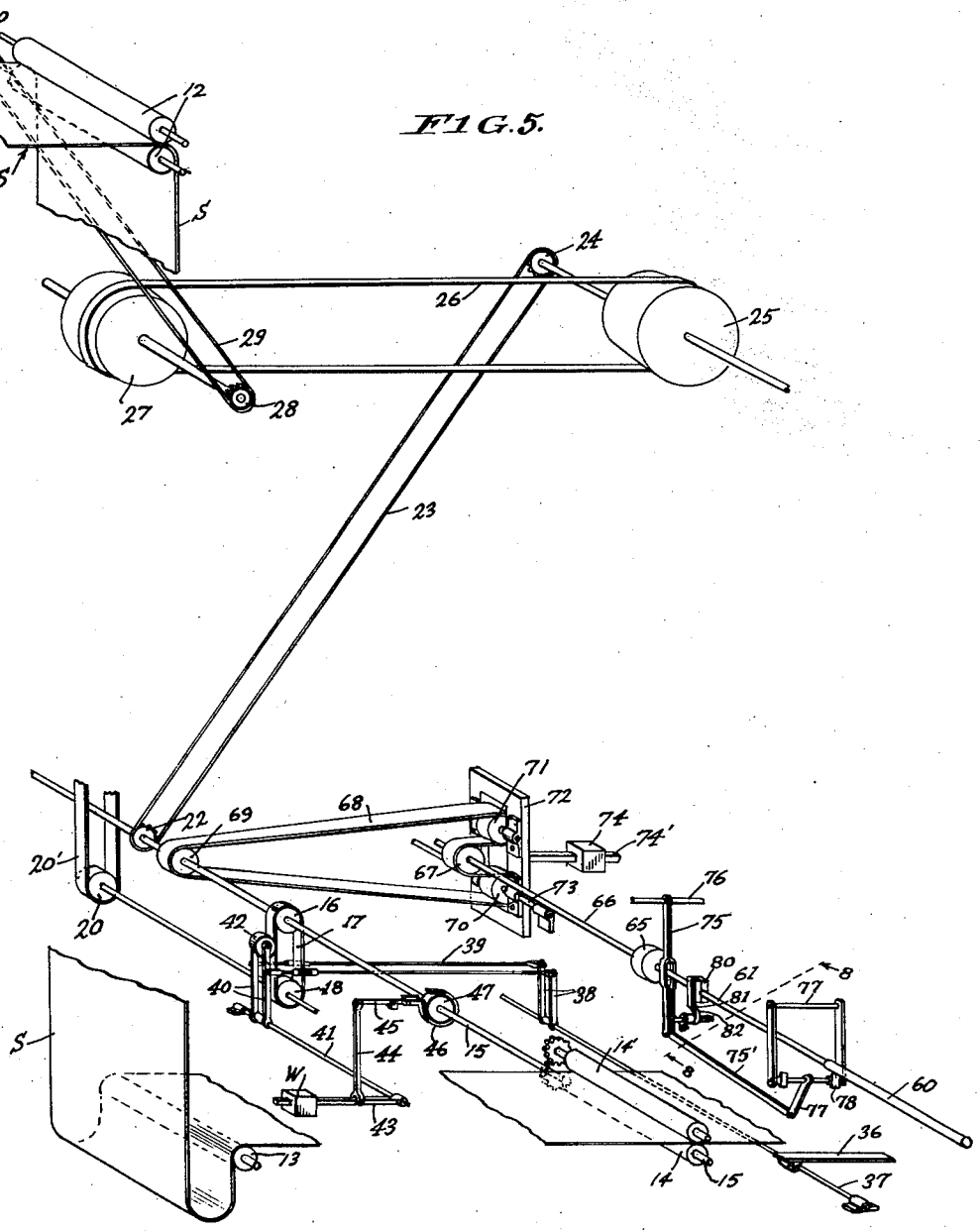
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May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

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FIG. 5.



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May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

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FIG. 6.

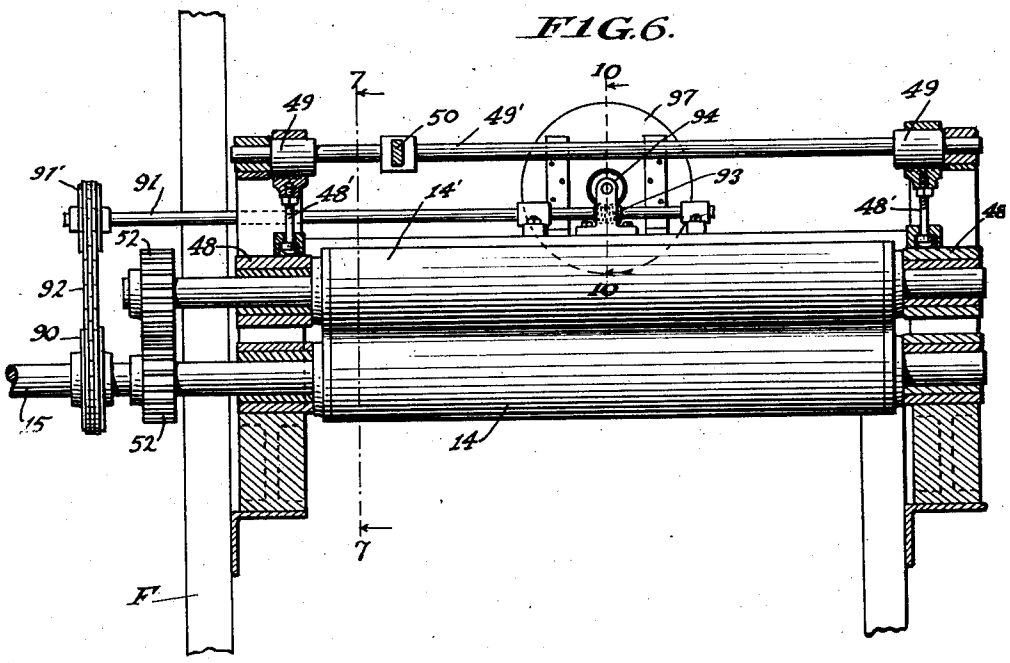
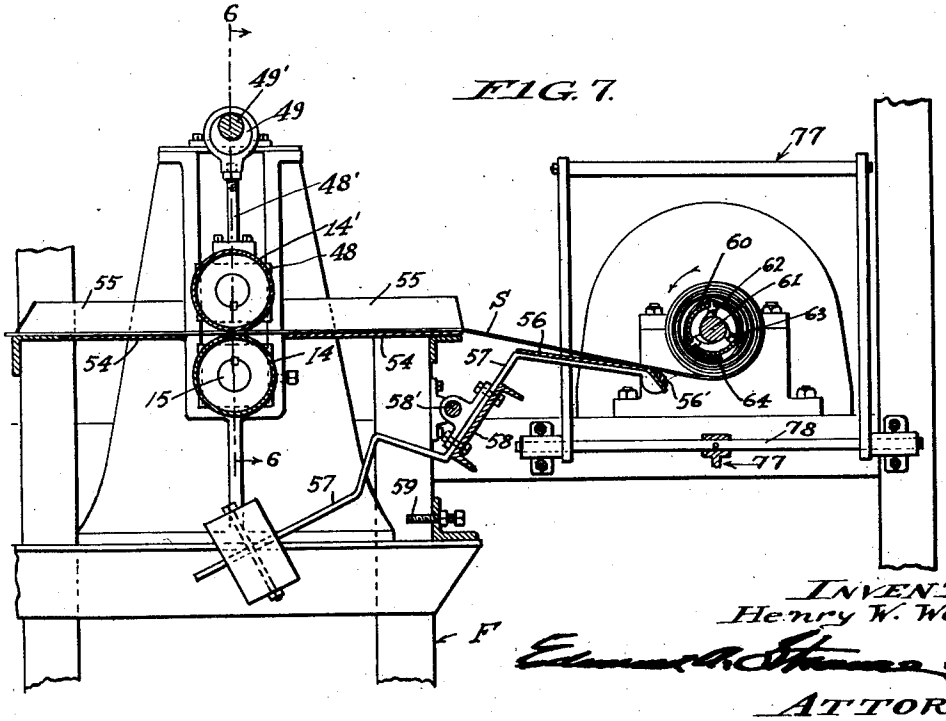


FIG. 7.



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May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

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FIG. 8.

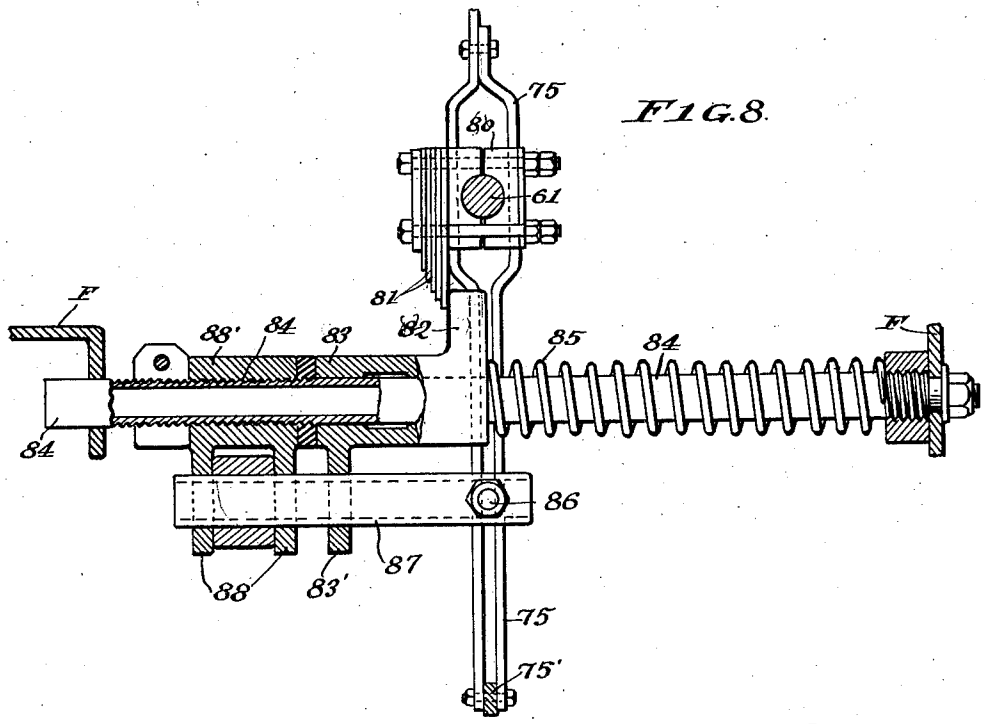
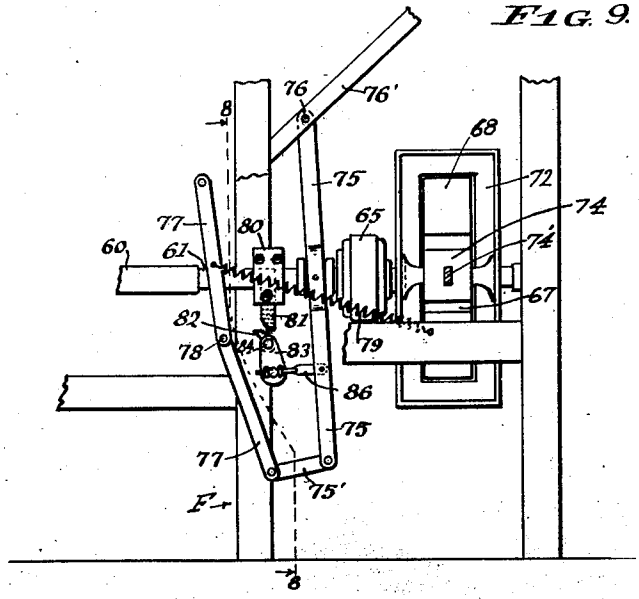


FIG. 9.



INVENTOR.
Henry R. Wood.

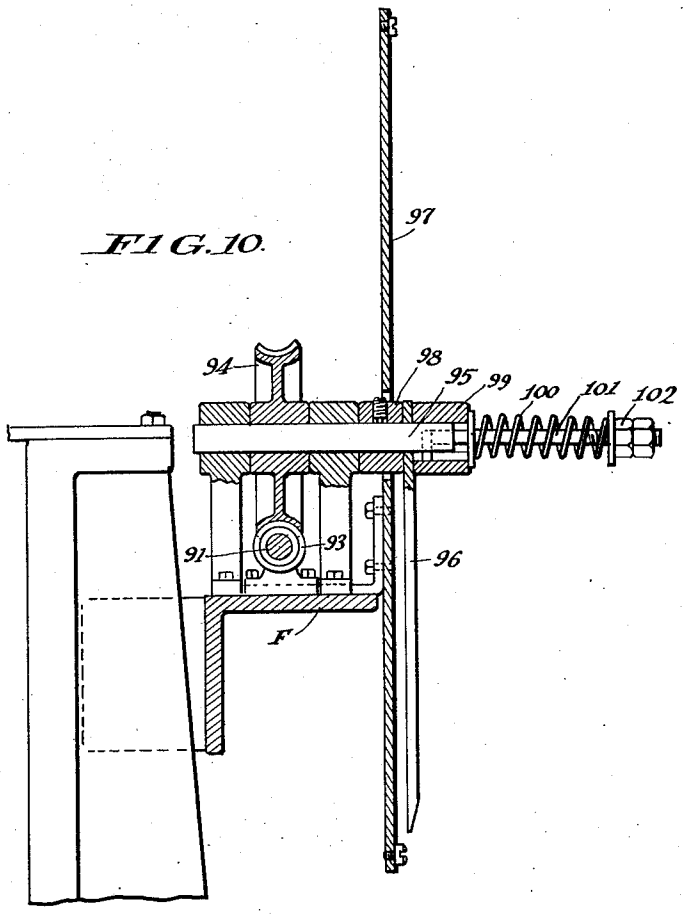
ATTORNEY.

May 31, 1932. H. R. WOOD 1,861,374

WINDING MACHINE FOR ROLLING ROOFING PAPER

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FIG. 10.



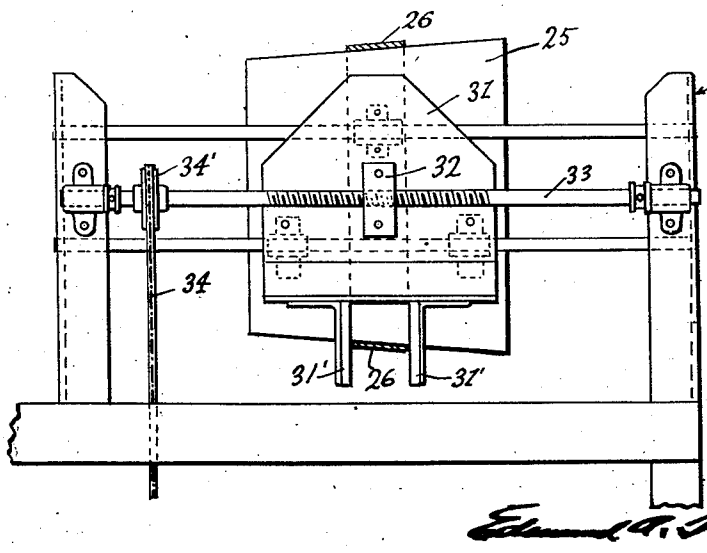


FIG. 11.

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Patented May 31, 1932

1,861,374

UNITED STATES PATENT OFFICE

HENRY RANDOLPH WOOD, OF SIERRA MADRE, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PATENT AND LICENSING CORPORATION, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

WINDING MACHINE FOR ROLLING ROOFING PAPER

Application filed October 10, 1928. Serial No. 311,481.

This invention relates to machines particularly adapted for winding strips of roofing into rolls, and the primary object thereof is to provide such a machine which may be easily handled by a single operator to wind the maximum footage into firm, even, marketable rolls, without excessive physical exertion on the part of the attendant, and without danger of abrasion by the moving strip or other injury.

A further object is to provide a machine having a minimum of control parts, these being located within easy reach of the operator without his moving from his station, and whereby the strip being wound may be continuously inspected, defective portions cut out, and the rolls cut off and removed with dispatch.

It is a particular object of the invention to provide a winding machine with which the operator may easily keep up with the production of the roofing manufacturing machine, and which will at the same time draw the strip through from the finish looper of the roofing machine and feed it to the winding mechanism as desired.

It is also an object to present a device which will automatically feed or thread the end of the strip to the winding mandrel when starting a new wind, or tuck the said end into a partially wound roll after cutting out a defect.

It is a further object of this invention to edge-guide the sheet into the feed rolls accurately, in order to produce wound rolls which are smooth and square at their circular ends. The loose loop maintained between the two pairs of rolls allows this to be done; (1) without requiring close control of the transverse position of the sheet in the looper, (2) without requiring the large space taken up by the sloping guide table which is commonly used, and (3) without risk of damage to the sheet by reason of excessive pressure of the sheet against the edge guides which sometimes occurs with the ordinary guide incline when the sheet is badly off center in the looper.

Incidental objects are to provide for continually varying the winding speed and for control thereof at any rate between zero and as much as 500 lineal feet per minute, to stop the mechanism frequently and quickly without injury to the parts, to make the device largely "fool-proof", to maintain a controlled winding tension, and to permit set-back measuring to allow for cut-outs and the like.

Briefly stated the invention may be said to reside in feeding mechanism (such as pull-rolls) for advancing the strip, means for selectively driving and stopping the feeding operation, and a winding mandrel; the invention residing also in means for selectively driving and stopping the mandrel. Means are provided for varying the winding rate, as well as means for automatically feeding the end of the strip to the mandrel, means for cushioning the stoppage of the mandrel, means for tensioning the strip being wound, and means for permitting slippage in the drive to care for feed differentials as the roll increases in diameter.

Combined with the winding mechanism are means for relieving pressure of both pairs of the feed rolls, measuring means capable of being set back to compensate for cut-outs or other variations, and means for adjusting the drive to maintain a substantially constant loose loop ahead of the feed rolls. According to a preferred form of the invention, a foot control is provided for the primary drive so that the machine as a whole can be set in operation and stopped at will, and a hand control is provided for drive of the mandrel whereby the latter may be driven, disconnected and stopped independently of the primary drive. The invention resides also in such other novel features of construction, arrangement and combination of parts as may be elsewhere herein set forth.

In the accompanying drawings, wherein one embodiment of the invention is disclosed by way of illustration;

Fig. 1, is a front elevation showing the machine from the operator's station, and is taken from the lines 1—1 of Figs. 2, 3, and 4.

Fig. 2, is an elevation from the left side as indicated by lines 2—2 of Figs. 1 and 4.

Fig. 3, is an elevational view of the right

side as indicated by lines 3—3 of Figs. 1 and 4.

Fig. 4, is a cross section taken from the lines 4—4 of Figs. 1 and 2, and indicating the lower portion of the machine in plan.

Fig. 5, is a skeletonized view in perspective showing the relation of the chief operative parts somewhat diagrammatically.

Fig. 6, is a vertical sectional detail taken on the lines 6—6 of Figs. 2, 4, and 7 showing the feed rolls construction.

Fig. 7, is a cross section on the lines 7—7 of Figs. 4 and 6 showing the mechanism for feeding to the winding roll.

Fig. 8, is a detail of the yielding stop mechanism employed for stopping rotation of the winding roll or mandrel when disengaged by releasing a clutch; this view is taken from lines 8—8 of Figs. 1, 4, 5, and 9.

Fig. 9, is an elevational detail taken from line 9—9 of Fig. 4 and showing more clearly than in Fig. 1 the stop mechanism of Fig. 8 and the clutch and drive for the winding mandrel.

Fig. 10, is a sectional detail taken on the lines 10—10 of Figs. 1, 4, and 6, showing the construction and drive of the counting mechanism.

Fig. 11, is a detail taken on lines 11—11 of Figs. 2 and 3 showing the belt shifting device.

In these drawings there is shown a main framework —F— which supports the chief members of the mechanism, a second framework —F'— being also provided to support a pair of pull rolls 12 which withdraw the fabric strip —S— from the finish looper or festoons and supply it to the loose loop of said strip which passes thence over a guide roll 13 and supplies a pair of feed rolls 14 and 14' carried in the frame —F—. The lower roll 14 of this pair is fixed upon a driven shaft 15 which is journalled in the framework —F— transversely of the machine and is provided with a driven pulley 16 actuated by a slip belt 17 driven from a pulley 18 fixed on a drive shaft 19 operated through a pulley 20 by a belt 20' from any prime mover.

A sprocket 22 on the shaft 15 serves through a chain 23 and a sprocket 24 to drive a cone pulley 25 which in turn operates through a belt 26 to drive a cone pulley 27 of opposite taper, the pulley 27 being connected through a sprocket 28, chain 29 and sprocket 30 to drive the pair of pull rolls 12.

In order that the rolls 12 may pull the strip —S— at a rate properly proportioned to the feeding rate of the rolls 14 and 14', there is provided a belt shifter comprising a plate 31 (Fig. 11) having belt engaging fingers 31', the plate having a nut 32 in which the control screw 33 is threaded, whereby rotation of the screw causes the thread to shift the plate and thereby shift the belt with consequent change in the relative rates of rotation of the cone pulleys 25 and 27. Rotation of screw 33 is imparted through chain 34 and sprocket 34' from a sprocket 35 and a hand wheel 35', the latter being positioned adjacent the operator's right hand when in his station at the front of the machine at the end of the strip being rolled.

When in his station, the operator is positioned for foot-actuation of a treadle 36 underlying the roll being wound and fixed to a rock shaft 37 carrying arms 38 connected with links 39 for actuating arms 40 likewise fixed to a rock shaft 41 and carrying an idle pulley 42 adapted to be forced into engagement with the slip belt 17 when the treadle 36 is depressed, whereby the shaft 15 and roll 14 are set in rotation through the pulley 16.

Rock shaft 41 also has fixed thereon an arm 43 weighted at —W— to withdraw the pulley 42 when the treadle 36 is released and to actuate a link 44 for swinging a braking lever 45 to tighten a brake band 46 upon a brake drum 47 also carried by shaft 15. Thus, when the treadle 36 is released, the slip belt 17 becomes slack through withdrawal of roller 42 and rotation of shaft 15 is stopped by brake 46.

The upper feed roll 14' is carried in vertically adjustable bearings 48, the adjustment being accomplished through the medium of links 48' connected with eccentrics 49 actuable by means of a shaft 49', an arm 50, and a cable 51 whose free extremity hangs in a position convenient to the operator's right hand. By such means the pressure upon the fabric between the rolls may be varied or entirely released. In order that the feeding effect may be uniform upon the opposite sides of the fabric the upper roll 14' is positively driven from the shaft 15 by means of a pair of gears 52, and in order that the strip may be properly guided a table or bed 54 having guide flanges 55 is positioned to conduct the strip to and from the rolls 14 and 14'.

At the discharge side of the table 54 an automatically-operating counter-weighted guide flap 56 is positioned (Figs. 2 and 7 particularly), this flap having an offset end 56' and being preferably in the form of a renewable bar or plate which may be replaced when badly worn by the continual drawing of the sheet material thereacross.

This flap 56 is carried upon a plurality of arms 57 mounted upon a channel bar 58 pivoted at 58' in the frame —F—, one of the arms 57 carrying a counterweight —CW— and having its movement limited by an adjustable stop screw 59 which thereby acts to limit the upward movement of the outer edge of said flap 56. Primarily, the function of this flap is to direct the end of the strip —S— to the winding mandrel 60 when starting the winding of a new roll (Fig. 2), or into a partial roll when the strip has been

cut to remove a defective portion or for any other reason.

The winding mandrel 60 is in the form of a sleeve or shell carried about a shaft 61 having radial cams 62 which serve to project and release collapsible splines 63 which extend longitudinally, and upon rotation of the shaft, are expelled by the cams sufficiently to insure proper clearance subsequently for removal of the roll when the splines are released by reverse rotation of the sleeve 60 upon the shaft 61. The mandrel is unsupported at its outer end so that the roll may be readily slipped off when freed. Upon the surface of the mandrel shell 60 an offset angle bar 64 extends the full length of the mandrel and provides a slot into which the free end of the strip —S— is guided by the flap 56 (Fig. 2), the rotation of the mandrel being such that the strip extremity caught under the bar 64 is carried from the position of Fig. 2, toward the flap 56 and doubled back as in Fig. 7 to insure retention. Thereafter during winding, the tension of the strip —S— serves to hold the flap in the lower position as in Fig. 7.

The mandrel shaft 61 is driven through the medium of a clutch 65 from a countershaft 66 carrying a driven pulley 67 rotated by means of a slip belt 68 driven by a pulley 69 fixed on the shaft 15 of the feed roll 14. In order to properly tension belt 68 and at the same time permit slight slippage when required, said belt is passed also over two idle pulleys 70 and 71 carried in a swinging frame 72 which is hinged at 73 to the framework and is overbalanced by a weight 74 adjustably carried on a laterally extending arm 74′. Thus some shocks of operation, as presently to be described, will be absorbed through bodily movement of pulley 71 which thereby relieves the driving tension.

Inasmuch as it is necessary at times to release the mandrel from its driving connection independently of the feed roll drive, means is provided for actuating the clutch 65, this means comprising a yoke-lever 75 connected with the clutch and pivoted on a rod 76 carried in a portion 76′ of the framework, the lower end of said lever 75 being pivoted to a link 75′ which is in turn actuated by a hand lever 77 which may have an open formation as shown and is fulcrumed at 78. Said hand lever 77 is positioned within easy reach of the operator's right hand and just below the hand wheel 35′, and if required a spring 79 may be employed for actuation in one direction.

In order that rotation of the mandrel 60 and its shaft 61 may be stopped immediately upon release of the clutch and without damage or undue shock to any of the operating parts, a yielding stop mechanism is provided as best indicated in Figures 8 and 9. This stop comprises a pair of clamp blocks 80 bolted to the shaft 61 and carrying a laminated leaf spring structure of the cantilever type wherein the leaves 81 are of graduated lengths. The spring stop 81 forms a striker arm and is positioned longitudinally of the shaft 61 so as to come in contact with a stop lug or dog 82 carried on a sleeve 83 and adapted to be swung to and from the path of the spring stop 81 as the latter rotates. The radial position of the spring stop or striker arm 81 is such that, when arrested by the lug 82, the slot bar 64 on the mandrel shell 60 is in its uppermost position ready to receive the end of the fabric strip —S— when being fed to the mandrel. The lug-carrying sleeve 83 is slidably and rotatably carried on a stem 84 fixed in brackets forming a part of the frame —F—, said stem carrying a large helical recoil spring 84 which engages the lug 82 and its sleeve 83 and acts as a cushion therefor, whereby heavy shocks may be absorbed. For the purpose of swinging the lug or dog 82, a link 86 connected with the yoke-lever 75 is fixed to a rod 87 which passes through an eye 83′ carried by sleeve 83 and is maintained in proper longitudinal position, i. e., parallel with the axis of the sleeve 83, by being mounted in a pair of ears 88 carried by an abutment sleeve 88′ non-slidably mounted upon stem 84.

Thus, as the yoke lever 75 is swung through manipulation of the hand lever 77, the link 86 swings the dog 82 into the path of the laminated spring striker arm 81, thereby stopping the shaft 61 and mandrel 60 with the slot-forming bar 64 in its uppermost position. The resilience presented by the spring striker arm 81 and the recoil spring 85 is sufficient to prevent battering of the cast stop lug 82, and this arrangement will operate for many months without material deformation or deterioration.

The foregoing constitutes a description of the construction of those operative parts which are required for winding and removing rolls of fabric. It is necessary however that a measuring device be provided for indicating the amount of fabric wound upon each roll, and it is desirable that the indicating hand thereof be easily adjustable to compensate for cut-outs such as those due to splices or other imperfections. For this purpose, the shaft 15 of the lower feed roll 14 is provided with a sprocket 90 (Fig. 6) which drives a countershaft 91 through the medium of a second sprocket 91′ and a chain 92. Shaft 91 is provided with a worm 93 meshing with a worm gear 94 (Figs. 6 and 10) on a shaft 95 which drives an indicating hand or pointer 96 around a graduated dial 97 fixed on the framework —F—. The hand 96 is friction held in order that it may be slipped to any adjustment desired by the operator at any time either for compensating for cut-outs or for re-setting at zero.

This friction mounting comprises an abutment collar 98 secured to the shaft 95 as by means of a set screw, a thrust collar 99 which bears against the hand 96 and presses the latter against collar 98, a tension spring 100 exerting pressure upon collar 99, a stem 101 secured to shaft 95 as an extension thereof and serving to support and position spring 100, and nuts 102 on the stem 101 to retain the spring. Thus as the feed roll 14 is rotated by shaft 15, the shaft 91 is driven to actuate the shaft 95 and the indicator hand 96 for indicating the amount of fabric wound upon the mandrel 60 to form the respective roll, and the friction mounting permits easy change of the position of the hand at any time.

When the machine is in inoperative condition, only the drive shaft 19 and drive pulley 18 are in rotation, the pulley 16 and shaft 15 being held by the brake band 46 under influence of weight —W—, and the treadle 36 being in elevated position. Also the clutch 65 is in disengaging position. When winding is to commence, the operator takes his station in front of the mandrel 60 where he can see the fabric as it is fed by rolls 14 and 14′ and where be can easily reach the hand lever 77 for actuating the clutch 65. In this position he can also reach the hand wheel 35′ in case it be necessary to change the relative rates of the cone pulleys 25 and 27 by shifting the shifter plate 31. Here he can also easily grasp the end of cable 51 in case it be necessary to relieve the pressure of the upper feed roll 14′ to properly align the strip —S—, or for any other reason.

The mandrel 60 is now stationary (as are the other parts) and the slot-forming bar 64 is in uppermost position. The operator now depresses the treadle 36 to release the brake 46 and move the idle roll 42 to take up slack in the slip belt 17, whereupon the shaft 15 begins to turn and drive the pull rolls 12 and the feed rolls 14 and 14′ and the belt 68 which in turn drives the countershaft 66 to the mandrel drive, the clutch 65 however being held out by the spring 79. The amount of speed is determined entirely by the amount of depression of the treadle 36 by the operator's foot, the open construction of the pulleys 16 and 18 and the great width of the belt 17 easily dissipating heat of friction from belt slippage at lower speeds, and maximum speed without slippage being obtained with full depression of the treadle.

The machine being now in operation, the strip —S— is pulled from the festoons by the pull rolls 12 and over the guide roll 13 by the feed rolls 14 and 14′ which pass said strip over the table 54 between the guide flanges 55 and project the strip end onto the guide flap 56 which is in the position of Figure 2 and automatically feeds said end directly into the slot formed by the angle bar 64 on the mandrel 60.

The instant the strip enters this mandrel slot, the operator draws the lever 77 into the position of Figure 9, thus releasing the striker arm 81 from the stop lug 82 (by withdrawal of the latter) and letting in the clutch 65 whereupon rotation of the shaft 61 and the mandrel shell 60 immediately commences as indicated in Figure 7, the end of the strip being doubled back, the splines 63 being thrown out by the cams 62 of said shaft 61 to expand the effective periphery of the mandrel in order that the roll may be subsequently removed easily as is well understood in the art. As the winding of the roll proceeds, the guide flap 56 is pressed downward against counterweight —CW— and the feed rolls 14 and 14′ serve to pull back against the tension of the mandrel drive in order to insure a tight wind. If any slippage is required to insure such tight wind, the mounting of the idle roll 71 permits such slippage. As the winding of the roll continues, the operator inspects the fabric as it passes between the feed rolls and the mandrel, being prepared to stop the winding and cut out defective portions should they appear. The winding is stopped by releasing the treadle 36, whereupon the brake 46 under influence of weight —W— stops the entire machine. Preferably, the mandrel rotation is stopped first, by actuation of lever 77 to release clutch 65 and bring stop lug 82 into the path of striker arm 81 an instant previous to release of treadle 36.

The front edge of the table 54 is used as a cutting guide, a hand knife being preferred for this purpose. As soon as the strip is cut, the counterweight —CW— throws the guide flap 56 up into position to feed the fresh end to the mandrel. If only a defective portion is removed, the indicating hand 96 will be set back accordingly, the machine will be started again, the said flap 56 will tuck the fresh end into the old roll and winding will continue until the roll is completed as indicated by indicator hand 96 travelling over dial 97.

When the winding of a roll has been completed, the entire machine is stopped by releasing the treadle 36, thus releasing belt 17 and causing application of the brake band 46 under influence of weight —W—. Under normal operation, the attendant then releases lever 77 which is then automatically shifted by spring 79 to throw out the clutch 65 and release the mandrel 60, the stop lug 82 being moved at the same time into the path of striker arm 81. The operator then cuts off the sheet and turns the roll manually backward until said striker arm 81 engages the stop lug 82, the backward rotation being continued slightly farther to collapse the splines 63 of the mandrel by disengaging the cams

62 from said splines. The wound roll is then slipped off the end of the mandrel.

The next step may be to turn the mandrel shell 60 manually back to position for the cams 62 to project the splines 63, the striker arm 81 still being in contact with the stop lug 82. In this stage of adjustment the slot formed in the mandrel by bar 64, is in its uppermost position and is now ready to receive the cut end of the strip for starting the winding of a new roll.

The angular movement required to turn the mandrel shell back to its expanded position (i. e., to project the splines) after removal of a wound roll, is slight. The operator may accomplish this by bringing the mandrel to such position manually as above described, but he may also thread the cut end of the sheet into the slot without such manual adjustment, and thus start the new wind at once. In this case, the relative driving effect of the mandrel shaft 61 inside the mandrel shell 60, causes the splines to be projected automatically, due to the fact that the striker arm 81 is yet in engagement with the stop lug.

The end of the strip having been positioned in the mandrel slot 64 and the splines 63 having been moved to expanded position, the lever 77 is actuated to withdraw stop lug 82 and engage the clutch 65, whereupon winding of the new roll proceeds.

Normally, the striker arm 81 strikes the stop lug 82 only gently, as when the mandrel shell 60 is rotated by hand. But occasionally the mandrel clutch is released before the entire winding mechanism has stopped, this being easy to do at high rates of production. In this case, the stop lug is moved into the path of the striker arm when the latter is yet moving at an appreciable speed. Here the cushioned stop features of the present construction serve to absorb the shock and prevent battering of the stop which would otherwise result. Thus the machine is fully protected against these strains.

I claim:

1. In a winding machine, a frame, a fixed center winding mandrel, an angle bar extending lengthwise thereof, a pair of feed rolls, a table having guide flanges disposed on each side of said feed rolls, a guide flap, a plurality of arms pivotally mounted in said frame supporting said guide flap, a counterweight secured to one of said arms, and adjustable stop means carried by said frame engaged by said arms, said flap serving to guide a strip passing through said feed rolls into the angle bar carried by said mandrel when starting the winding of a new roll, said flap assuming an inclined position as the strip is wound on the mandrel, whereby when it is necessary to remove a portion of the strip the end of a strip passing from said feed rolls may be tucked between the convolutions of the strip wound on the mandrel.

2. In a winding machine, a frame, a winding mandrel having means for receiving the end of a strip, a pair of feed rolls, a table adapted to support a strip passing between said feed rolls, a flap pivotally mounted on said frame adapted to guide the end of a strip passing from said table into the end receiving means on said mandrel, and a counterweight carried by said flap adapted to restore it to its original guiding position after a roll has been removed from said mandrel.

3. In a winding machine, a frame, a winding mandrel having a strip receiving member extending lengthwise thereof, a pair of feed rolls, a horizontally disposed table on each side of said feed rolls adapted to support a strip passing between said feed rolls, a guide flap, a plurality of arms supporting said guide flap, said arms secured to a cross member pivotally mounted on said frame, an adjustable stop screw carried by said frame and engaged by one of said arms, and a counterweight carried by one of said arms, said guide flap assuming an inclined position when a strip is fed from the feed rolls to the mandrel.

In testimony whereof I affix my signature.

HENRY RANDOLPH WOOD.